Implicit Relational Learning in a Multiple-Object Tracking Task

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Background

- Can people use relational information implicitly (i.e., without being explicitly aware)?
- Previously, we found that people can use relational contextual information presented in the background to guide their choices (Lazareva, McInnerney, & Yuen, 2010)
- The task was impossible to solve unless a person utilized contextual information
  - Feedback (correct or incorrect choice) was irrelevant
  - Speed of motion was very high (10 px per frame)
  - People had to track 4 objects out of 8 (very difficult)

Two experimental questions

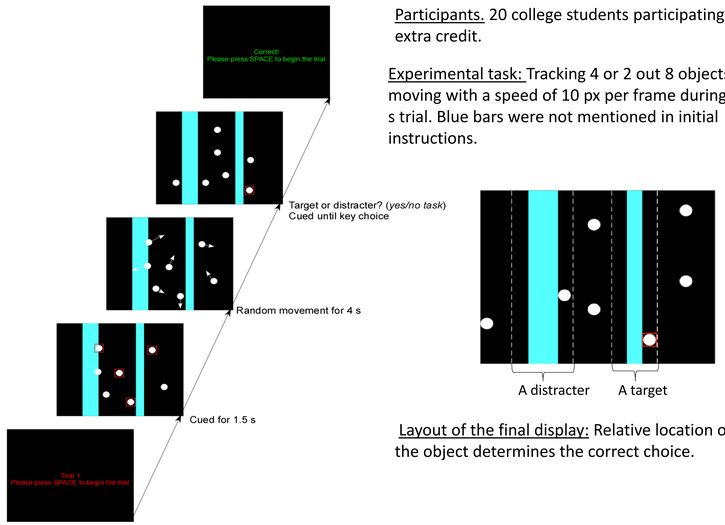
(1) Do people really track the objects in our task?

- Manipulate number of objects to be tracked (2 vs. 4): If tracking is attempted, then 2-object task should produce higher accuracy than 4-object task

(2) Would people use relational information in less challenging circumstances?

- Use appropriate feedback but leave the speed of motion the same (10 px per frame)

Method



Participants. 20 college students participating for extra credit.

Experimental task: Tracking 4 or 2 out 8 objects moving with a speed of 10 px per frame during 4-s trial. Blue bars were not mentioned in initial instructions.

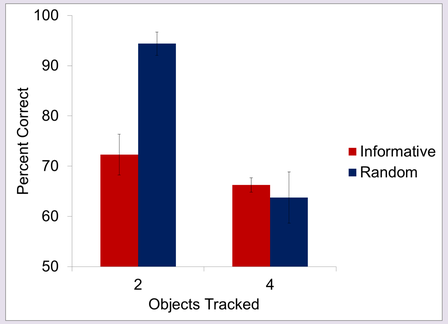
Layout of the final display: Relative location of the object determines the correct choice.

Design. Two experimental conditions: Informative (bars predict the correct choice) and Random (bars do not predict the correct choice). In Informative condition, the target could always land next to the thin strip or next to the thick strip depending on counterbalancing.

Procedure. Two-pair training (1 vs. 2 and 5 vs. 6, where numbers represent the width of the strip presented in the background) for 80 trials. Testing: presentation of novel widths (1 vs. 5, 2 vs. 3, 3 vs. 4, 4 vs. 5, and 5 vs. 6) interspersed among training trials, for a total of 108 trials. Similar to transposition procedure in Lazareva, Young, & Wasserman (2005).

Postexperimental questionnaire to test awareness: None of the participants in any condition were aware of the task contingencies. Some reported that the bars were distracting.

Results: Training



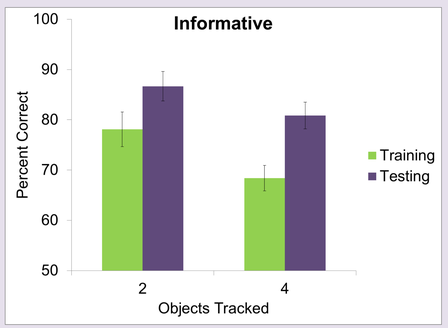
- Significant main effect of number of objects
  - Suggests that both groups attempt to track the objects
- Significant Condition x Object interaction
  - Informative condition is less accurate than Random when two objects are tracked and equally accurate when 4 objects are tracked
  - Additional information may be distracting when the task is easy

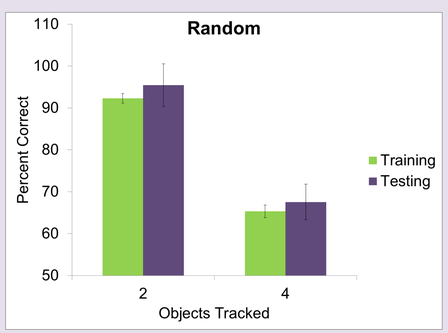
Results: Testing

- Testing includes new combinations of bar widths (1 vs. 5, 2 vs. 3, 3 vs. 4, 5 vs. 5, and 5 vs. 6)
  - The same feedback ("correct") follows choices on these trials

Points of interest

- Is there reliable transfer to novel combinations of bar widths?

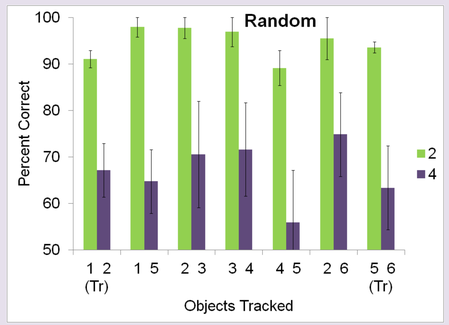


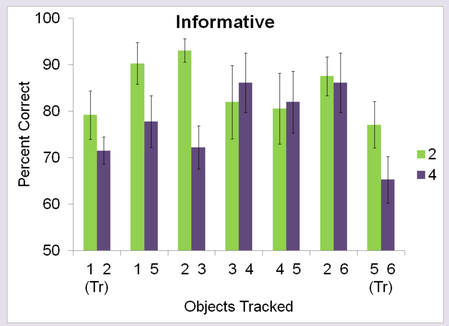


- Significant Condition x Trial Type interaction
  - In Informative condition, training pairs produce lower accuracy than testing pairs
  - In Random condition, training and testing pairs are equally accurate
- Significant Condition x Object interaction
  - When 2 objects are tracked, informative condition is significantly lower
  - When 4 objects are tracked, Informative condition is significantly higher
  - When the task is difficult, additional information helps

Points of interest

- Is there higher relational responding on trials with easily discriminable bars?
  - 1 vs. 5 compared to 3 vs. 4





- In Random condition, different combinations of bars produce similar pattern of performance
  - Indicates that objects are equally easy (or difficult) to track on all trials
- In Informative condition, bar combinations strongly affect performance
  - Especially when 2 objects are tracked
  - Indicates that people are engaging in implicit relational discrimination when making the final choice
- Need a larger sample for a reliable statistical analysis

Conclusions

- Participants successfully utilized relational information associated with background in a task that requires sustained attention to the objects
- They have done so in an implicit manner, in absence of conscious awareness
- Number of objects affects tracking accuracy in Informative condition
- This suggest that people are actually attempting to track objects in Informative condition, even though their decision is based on the contextual information rather than on the results of tracking
- Multiple-object tracking technique can be used to study implicit relational learning

Acknowledgments

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References

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